Algebra II Core Final Exam Review

1) Create a sketch of each of the following parent functions.
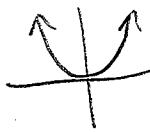
a) $f(x) = x^2$ b) $f(x) = x^3$ c) $f(x) = x^4$ d) $f(x) = \sqrt{x}$ e) $f(x) = \sqrt[3]{x}$

2) Sketch Each of the following transformations from the parent function; $f(x) = x^2$.

a) $f(x) = (x - 4)^2 - 2$

right 4   down 2
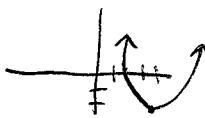
b) $f(x) = (x + 4)^2 - 2$

left 4 dow 2
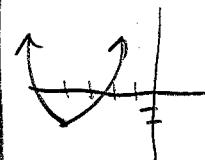
c) $f(x) = (x + 4)^2 + 2$

left 4 up 2
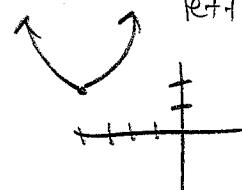
3) State the domain and range of each of the following.

a) $f(x) = (x)^2 - 2$

D: $(-\infty, \infty)$

R: $[-2, \infty)$

b) $f(x) = \sqrt{x + 4}$

D: $[-4, \infty)$

R: $[0, \infty)$

c) $f(x) = \sqrt[3]{x - 2} + 5$

D: $(-\infty, \infty)$

R: $(-\infty, \infty)$

4) The amount of money, A, accrued at the end of t years when a certain amount, P, is invested at a compound annual rate, r, is given by $A = P(1 + r)^t$. If a person invests $500 in an account that pays 4% interest compounded **annually**, find the balance after 15 years.

$A = 500(1 + 0.04)^{15}$

$500(1.04)^{15}$

$A = 900.47$

$\$ 900.47$

5) The population of Smallsville was 480 people in 2010. From 2010-2016 the population was growing at a rate of 2.5% per year, where t = 0 represents 2010. What will the population of Smallsville be in 2020?

$A = 480(1 + 0.025)^{10}$

$480(1.025)^{10}$

$A = 614$

614 people

6) A new car is purchased for $26,500. The car depreciates at a rate of 9% per year. Find the value of the car after 8 years.

$$A = 26,500(1 - 0.09)^8$$
$$26500(0.91)^8$$

$$A = 12461.69$$

7) Mr. Smith invests $100 in an account that pays 2% annual interest compounded continuously. How much will Mr. Smith have in 8 years?

✱ remember e is a constant

$$A = Pe^{rt}$$

$$A = 100e^{0.02(8)} = 117.35$$

P = initial amount
r = annual rate of interest
t = # of years

8) Sketch a graph of each of the following, then identify the domain and range.

a) $f(x) = \left(\frac{1}{2}\right)^x + 4$

D: $(-\infty, \infty)$
R: $(4, \infty)$

b) $f(x) = \ln x - 1$

D: $(0, \infty)$
R: $(-\infty, \infty)$

c) $f(x) = -e^x$

D: $(-\infty, \infty)$
R: $(-\infty, 0)$
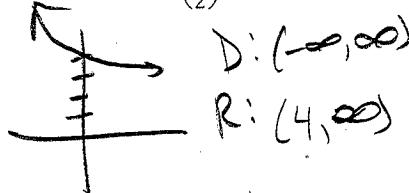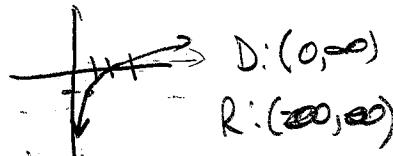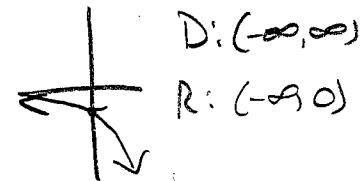
9) What is the inverse of $f(x) = 2^x$.

① switch x & y → $x = 2^y$

② switch to log form → $\log_2 x = y$

$$f^{-1}(x) = \log_2 x$$

10) Identify the asymptote of $f(x) = 3\log_8 x$.

$$x = 0$$

11) Convert to radian.

a) 320° $\times \dfrac{\pi}{180}$

$$\frac{320\pi}{180} = \frac{16\pi}{9} \text{ or } 5.59$$

b) -135° $\times \dfrac{\pi}{180} = -\dfrac{135\pi}{180} = \dfrac{3\pi}{4}$

or

2.36

12) Convert to degree.

a) $\frac{7\pi}{8} \cdot \frac{180}{\pi} = \frac{7 \cdot 180}{8}$

$\frac{315°}{2}$ or $\boxed{157.5°}$

b) $\frac{15\pi}{24} \cdot \frac{180}{\pi} = \boxed{112.5°}$

13) Find two coterminal angles for each of the following. ✻ Add & subtract 360° or 2π

a) $30°$ $\xrightarrow{+360}$ $\boxed{390°}$

$\xrightarrow{-360}$ $\boxed{-330°}$

b) $\frac{27\pi}{5}$ $\xrightarrow{+2\pi}$ $\frac{10\pi}{5} = \boxed{\frac{37\pi}{5}}$

$\xrightarrow{-2\pi}$ $-\frac{10\pi}{5} = \boxed{\frac{17\pi}{5}}$

14) Find the reference angle of each of the following.

a) $345°$ $\boxed{15°}$

345

b) $\frac{3\pi}{5}$ $\boxed{\frac{2\pi}{5}}$

$2\pi/5$ $\frac{3\pi}{5}$

c) $-\frac{17\pi}{6}$ $\boxed{\frac{\pi}{6}}$

ref $\pi/6$ $-\frac{17\pi}{6}$

15) Find the exact value of each of the following: (use the unit circle)

a) $\sin 60°$ $\boxed{\frac{\sqrt{3}}{2}}$

b) $\cos \frac{11\pi}{6}$ $\boxed{\frac{\sqrt{3}}{2}}$

c) $\tan -\frac{3\pi}{4}$ $\boxed{-1}$

d) $\sin -120°$ $\boxed{-\frac{\sqrt{3}}{2}}$

e) $\cos \frac{25\pi}{6}$ $\boxed{\frac{\sqrt{3}}{2}}$

f) $\tan 30°$ $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$ $\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{2} \cdot \frac{2}{\sqrt{3}} = \frac{1}{\sqrt{3}}$

$\boxed{\frac{\sqrt{3}}{3}}$

16) Find the mean, median, mode and standard deviation of the following data.

12, 13, 12, 15, 20, 12, 14, 12, 16, 26, 21, 17, 17, 19, 20, 21, 12, 15, 16, 12

Mean: 16.1 Median: 15.5 Mode: 12 Standard Deviation: 3.90

17) Use the graph to estimate the mode of the data set.

Answers will vary,

somewhere between

70 & 80.

Grades on the English Test

(histogram: Number of People vs Grade on the Quiz, x-axis 40 50 60 70 80 90 100)
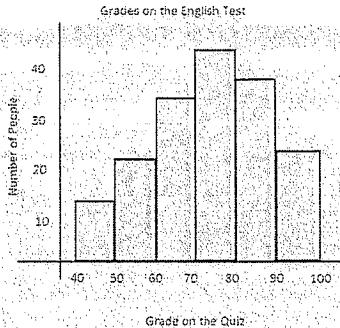
18) Two cards are chosen at random from a deck of cards with replacement, find P(Red, Spade).

P(Red) then P(Spade)

$$\frac{26}{52} \cdot \frac{13}{52} = \frac{338}{2704} = 0.125$$

12.5%

19) A bag of marbles contains 12 black marbles, 28 white marbles, and 10 brown marbles. Two marbles are chosen from the bag without replacement, find P(white, white).

$$\frac{28}{50} \cdot \frac{27}{49} = \frac{756}{2450} = 0.3085$$

30.9%

20) A card is randomly selected from a standard deck of 52 cards. Give a possible draw that would have a probability of 4/52.

$$P(Jack) = \frac{4}{52}$$

Answer may vary.

Needs to be a card where there are 4 of them like 2's or 3's.