

## Spring 2015 Math 151

### Week in Review 8 courtesy: Amy Austin (Covering 4.5-4.8)

#### Section 4.5

- A bacteria culture starts with 400 bacteria and the population triples every 20 minutes.
  - Find an expression for the number of bacteria after  $t$  hours.
  - Find the number of bacteria after 2 days.
  - When will the population reach 20,000?
- Polonium-210 has a half-life of 140 days. If a sample has a mass of 200 mg, find a formula for the mass that remains after  $t$  days.
- After 3 days a sample of radon-222 decayed to 58% of its original amount. What is the half-life of radon-222?
- The rate of change of atmospheric pressure  $P$  with respect to altitude  $h$  is proportional to  $P$ , provided that the temperature is constant. At a specific temperature the pressure is 101 kPa at sea level and 86.9 kPa at  $h = 1,000$  m. What is the pressure at an altitude of 3500 m?
- A curve that passes through the point  $(0, 25)$  has the property that the slope at every point  $(x, y)$  is eight times the  $y$  coordinate. Find the equation of the curve.
- A pie is taken from an oven, where the temperature is  $450^\circ$ , to a  $75^\circ$  room. After 15 minutes, the temperature of the pie reads  $350^\circ$ . What will the temperature of the pie be after 27 minutes?

#### Section 4.6

- Compute the following without the aid of a calculator.

a.)  $\arcsin\left(\frac{\sqrt{3}}{2}\right)$

b.)  $\arccos\left(-\frac{1}{\sqrt{2}}\right)$

c.)  $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$

d.)  $\arctan\frac{1}{\sqrt{3}}$

e.)  $\cot\left(\arccos\left(-\frac{3}{5}\right)\right)$

f.)  $\sin(\arcsin 2)$

g.)  $\arccos\left(\cos\left(\frac{2\pi}{3}\right)\right)$

h.)  $\arctan\left(\tan\frac{5\pi}{4}\right)$

i.)  $\arcsin\left(\sin\left(\frac{11\pi}{6}\right)\right)$

j.)  $\sin\left(2\arccos\left(\frac{1}{3}\right)\right)$

- Find the derivative of  $y = \arctan(1 - x)$
- Find the equation of the tangent line to the graph of  $y = \arcsin\frac{x}{2}$  at  $x = -1$ .
- What is the domain of  $f(x) = \arcsin(2x - 1)$ ? Of  $\arctan(2x - 1)$ ?
- $\cos(\arctan x)$  is equivalent to what?

#### Section 4.8

- Find the following limits.

a.)  $\lim_{x \rightarrow \infty} \frac{(\ln x)^2}{x - 1}$

b.)  $\lim_{x \rightarrow 0} \frac{\sin x - x}{x^3}$

c.)  $\lim_{x \rightarrow 0^+} x^2 \ln x$

d.)  $\lim_{x \rightarrow \infty} (e^x + x)^{\frac{1}{x}}$

e.)  $\lim_{x \rightarrow 0} (\sin x)^{\tan x}$

f.)  $\lim_{x \rightarrow 1} \left(\frac{1}{\ln x} - \frac{1}{x - 1}\right)$