Math 241: Review of Essential 140 and 141 Dr. Justin Wyss-Gallifent

Directions: Do as many of these as you can. In discussion on Thursday you will review those which you had trouble with.

1. Given the function $f(x) = (x-2)(x-5)$, find the equations of two lines: one tangent to $f(x)$ and the other perpendicular to $f(x)$, both at $x = 2$. Draw graphs of all three on a single graph.

2. Evaluate the following derivatives:

   (a) $\frac{d}{dx} \tan(2x^2 + 1)$

   (b) $\frac{d}{dt} t^2 e^{-t}$

   (c) $\frac{d}{dx} \sin^{-1}(5x)$

3. Evaluate the following integrals:

   (a) $\int \sqrt{1-x}\ dx$

   (b) $\int \frac{1}{\sqrt{4-x^2}}\ dx$

   (c) $\int \cos^2(3x)\ dx$

   (d) $\int 3xe^{-2x}\ dx$

4. Plot the curves with the following parametrizations:

   (a) $x = 3t + 1$ and $y = 1 - t$ for $0 \le t \le 3$.

   (b) $x = 2\cos t$ and $y = 3\sin t$ for $0 \le t \le \pi$.

5. Plot the following polar graphs:

   (a) $r = \cos\theta$

   (b) $r = 3$

   (c) $r = 2\sec\theta$.   Hint: $r\cos\theta = x$.