1) Given that $\sin\theta = \frac{4}{5}$ *and* $\frac{\pi}{2} < \theta < \pi$:

a) Find $\sin(2\theta)$ $\cos(\theta) = \frac{-3}{5}$

$$sin(2\theta) = 2sin\theta cos\theta = 2 * \frac{4}{5} * \frac{-3}{5} = \frac{-24}{25}$$

b) Find $\cos(2\theta) = 1 - 2sin^2\theta = 1 - 2 * \left(\frac{4}{5}\right)^2 = \frac{-7}{25}$

2) Develop the formula for $\tan(2\theta)$ in terms of $\tan\theta$.

$$tan(2\theta) = \frac{sin(2\theta)}{cos(2\theta)} = \frac{2sin\theta cos\theta}{cos^2\theta - sin^2\theta} * \frac{\frac{1}{cos^2\theta}}{\frac{1}{cos^2\theta}} = \frac{2\frac{sin\theta}{cos\theta}}{1 - \frac{sin^2\theta}{cos^2\theta}}$$

$$= \frac{2tan\theta}{1 - tan^2\theta}$$

3) Use your formula to find $\tan(2\theta)$ if θ in an angle in the 3rd quadrant such that $\sin\theta = -\frac{3}{4}$

IMPORTANT VARIATIONS OF THE DOUBLE-ANGLE FORMULAS

$$(i) \quad \sin^2\theta = \frac{1 - \cos(2\theta)}{2}$$

$$(ii) \quad \cos^2\theta = \frac{1 + \cos(2\theta)}{2}$$

$$(iii) \quad \tan^2\theta = \frac{1 - \cos(2\theta)}{1 + \cos(2\theta)}$$

4) Establish identity (i), (ii), and (iii) below.